

## Long-Term Effects of Bisphenol A Exposure, with Retha Newbold

Ernie Hood

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Cities and states across the United States, as well as other nations abroad, are banning bisphenol A (BPA) due to concerns about adverse health effects of low doses of this widely used industrial compound, particularly among fetuses, infants, and young children. In this podcast, Retha Newbold describes the findings of one of the few studies to study long-term effects of prenatal exposure to BPA in mice. Newbold is a staff scientist/reproductive biologist in the NIEHS Toxicology Branch and the lead author of "Prenatal exposure to bisphenol A at environmentally relevant doses adversely affects the murine female reproductive tract later in life."

**AHEARN:** It's *The Researcher's Perspective*. I'm Ashley Ahearn.

Bisphenol A, or BPA, is a petrochemical used in products from polycarbonate baby bottles to CD cases to dental sealants. And according to the Centers for Disease Control and Prevention, it's likely found in more than 90% of the U.S. population.<sup>1</sup>

The problem with BPA is that it mimics estrogen, a hormone critical to reproductive health. Even at relatively low doses, it's been linked to reproductive, immune, and neurologic problems in lab animals.<sup>2</sup>

Retha Newbold is a developmental reproductive biologist with the National Institute of Environmental Health Sciences. She's been studying environmental estrogens for over 30 years.

In 2009 Newbold reported on research in which she exposed pregnant lab mice to BPA between days 9 and 16 of gestation. She then looked for effects on the reproductive tract in their offspring at age 18 months—that's the equivalent of old age for mice.<sup>3</sup>

Science writer Ernie Hood asked her about what happened to the exposed mice and what that could mean for humans.

**HOOD:** Tell us a little bit about your findings.

**NEWBOLD:** Well, what we saw with these animals that were exposed just this brief time during development is they had an increase in ovarian problems, say ovarian lesions. They also had some problems in other portions of the reproductive tract. Now, we didn't look at other tissues, and it may be that other tissues may have effects, but I am a reproductive and developmental biologist, so I was specifically interested in looking at effects on the reproductive tract. So that's what this study focused on.

But you know, out of all the controversy and all the concern that's going on with BPA, there are very few studies that have looked at long-term effects. This is one of the first times that we've actually looked at long-term effects.

BPA is still a compound that we just don't know that much about, and we really need to be concerned about this, because we know from studies from the CDC that over 90% of the population actually has been exposed to BPA because we're picking it up in the urine. We also know that it's in a lot of different plastics, so the potential for exposure is quite high. So we need to know the long-term effects—if there are truly any adverse effects. And right now the animal studies are leaning toward that direction.

**HOOD:** With so many questions still remaining about the impact on human health of this high-production-volume, ubiquitous chemical, what do you consider to be the research priorities regarding BPA?

**NEWBOLD:** We definitely need more animal studies, we need to understand the mechanisms that are responsible for some of these adverse effects, but in particular I think one of the major focuses should be on the human population and coming up with a good, solid epidemiology study where we can actually look and see what humans are exposed to, how much, and when. And that's going to be a little bit more difficult. And those types of studies, I think, too, can be built into some of the experimental studies.

I'm not really sure with experimental animals whether just doing more and more and more studies is going to help anything. We need to have some defined points, which

would be: is there a critical window, and is there a critical tissue that is responding to BPA? We need to know more specific details; just doing more and more and more studies isn't going to do it. The studies now, we need to focus in and look at specific questions—critical time points, critical windows of exposures, critical tissues that could respond to this [BPA exposure]. These are things I think that really, really need additional attention.

**HOOD:** You are known for your groundbreaking research on DES, the potent synthetic estrogen used to prevent miscarriages in the late 1940s to 1970s.<sup>4</sup> What other chemicals do you think may be worthy of study for the same sorts of effects as seen with DES and BPA? And do you have any plans to initiate new studies involving them?

**NEWBOLD:** There are studies ongoing right now with some of the phthalates. A number of the different federal agencies as well as some of the academic labs and the pharmaceutical companies—everyone seems, is interested in looking at effects of environmental endocrine-disrupting chemicals. At this point we're not even sure, of all of the chemicals, which ones do have estrogenic activity.

I am interested in some of the phthalates: I'm interested in compounds specifically in cosmetics, things like this. Also, we know that it's not only just synthetic chemicals that may be having a problem, but there are some chemicals that naturally occur in the environment that have estrogenic activity—for example, some of the components in soy products. So, one of those in particular is genistein.

So that is something that I am interested in right now, and my main reason for this is because of the potential for fetal and early neonatal exposures. Some of these things—I mean, we don't even know what all of them are in the environment that have estrogenic activity, but the ones that most concern me are the ones where we have the potential for fetal and early childhood exposures. Those are the ones that really are the most important, the ones that we should be most concerned about.

**AHEARN:** That was science writer Ernie Hood talking with Retha Newbold. She's a developmental reproductive biologist with the National Institute of Environmental Health Sciences who's been researching environmental estrogens for over 30 years.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

**Ernie Hood** is a science writer, editor, and podcast producer in Hillsborough, North Carolina. He also produces and hosts the weekly science radio show *Radio in Vivo*.

### References and Notes

<sup>1</sup> Calafat AM, et al. Environ Health Perspect 116(1):39–44 (2008); doi:10.1289/ehp.10753.

<sup>2</sup> Halden RU. Annu Rev Public Health 31:179–194 (2010); doi:10.1146/annurev.publhealth.012809.103714.

<sup>3</sup> Newbold RR, et al. Environ Health Perspect 117:879–885 (2009); doi:10.1289/ehp.0800045.

<sup>4</sup> According to the Centers for Disease Control and Prevention (<http://tinyurl.com/38p9wos>), women who took DES, or diethylstilbestrol, during pregnancy have a modestly increased risk of breast cancer. Daughters of these women are at higher risk for clear cell adenocarcinoma, reproductive tract structural differences, pregnancy complications, and infertility, whereas sons of these women are at increased risk for noncancerous epididymal cysts.